

Decarbonizing Aviation

ICARUS SAF Policy Workshop

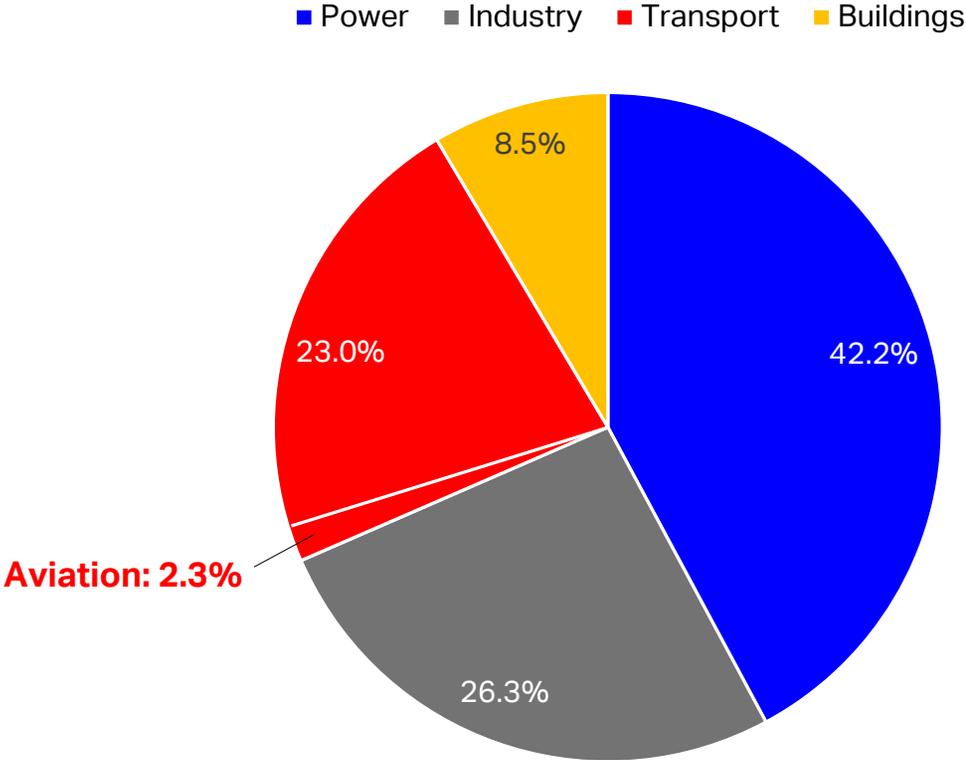
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The Big Picture...





Our commitment:

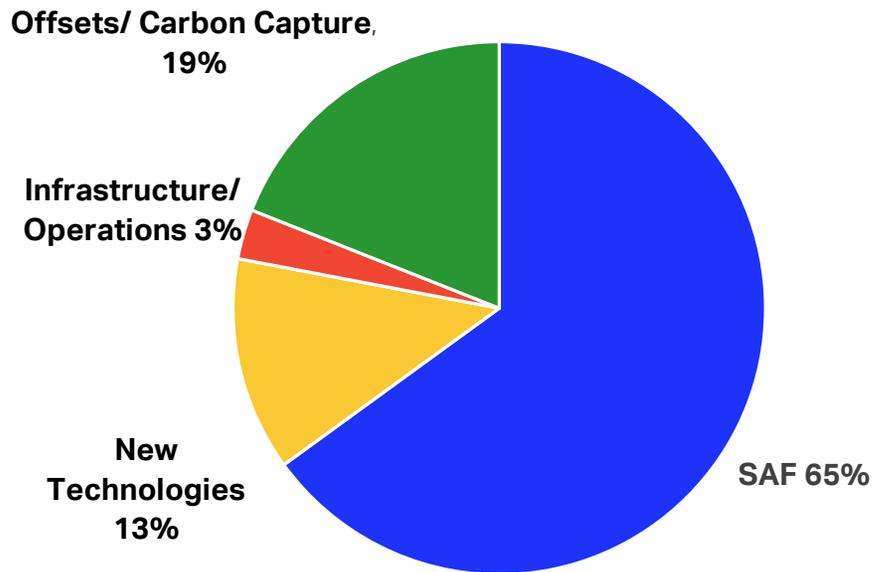
TO ACHIEVE NET ZERO CARBON EMISSIONS BY 2050

Target aligned with the global community's broader commitment to tackling climate change and minimizing the global temperature increase

It is also aimed at keeping the benefits of global connectivity for future generations



All levers are needed to reach Net Zero!



Source: IATA Sustainability and Economics

- Multiple levers required in different combinations to achieve net-zero emissions
- IATA estimates that 65% of emissions reductions by 2050 will be achieved by SAF
- ~800-1,000 x increase in production is needed by 2050
- Strong and urgent public policy support will be imperative to meet the net zero targets.

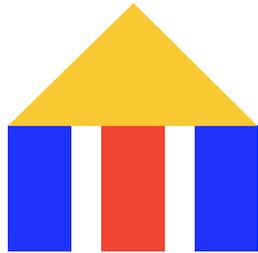
ICAO CAAF/3 Outcome

5% CO₂ emissions reduction
in international aviation by 2030
through SAF and LCAF

- **682Mt of CO₂** expected to be produced by international flights in 2030
- **34Mt** should be reduced through SAF & LCAF
- This would correspond to **~ 14 Mt SAF**

Mt: million tonnes; 1 tonne = 1,250 liters

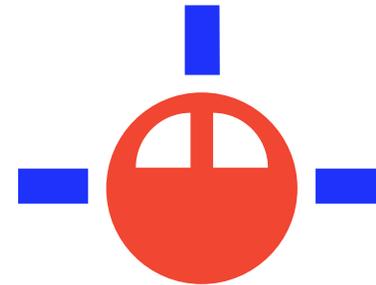
Global Policy and Airline Commitments



2030 estimate

17Mt

**includes incentivizing
policies and mandates**



2030 estimate

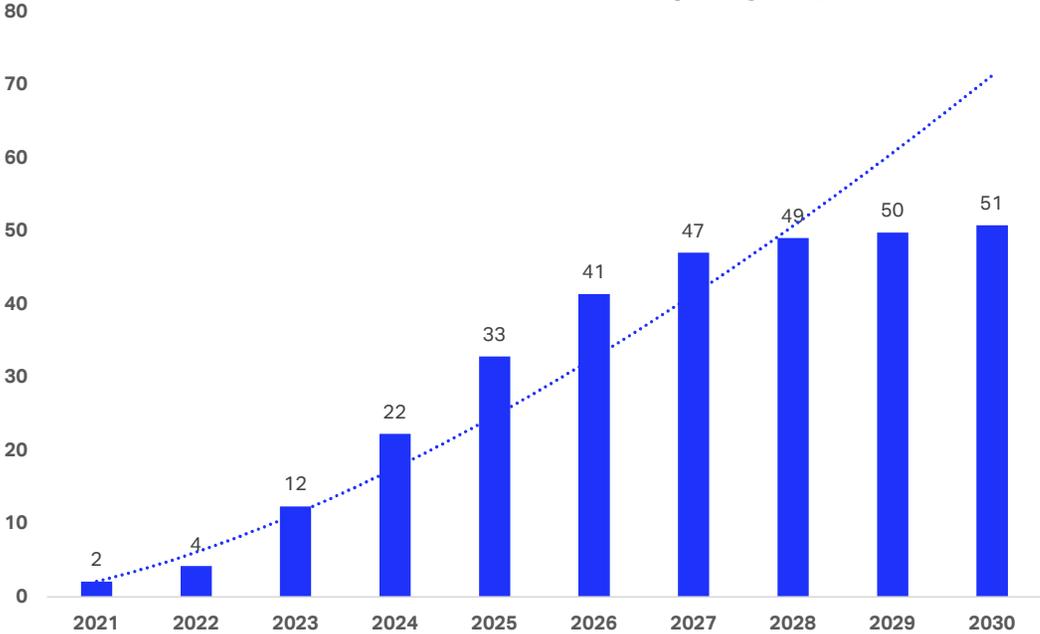
15Mt

**64 airlines with SAF
voluntary commitments /
agreements**



Renewable Fuel Capacity by Region for 2030

Cumulative Renewable Fuel Capacity (Mt)



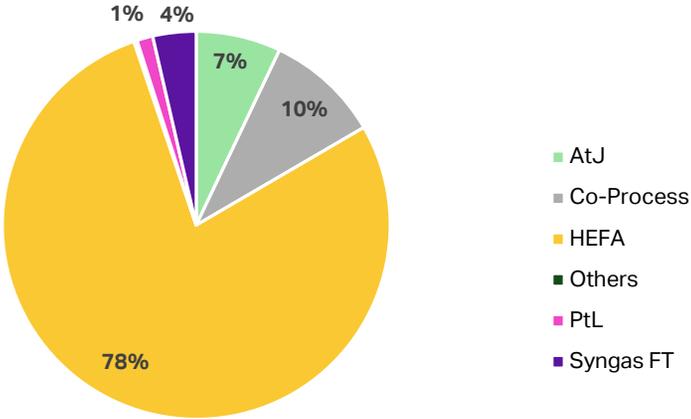
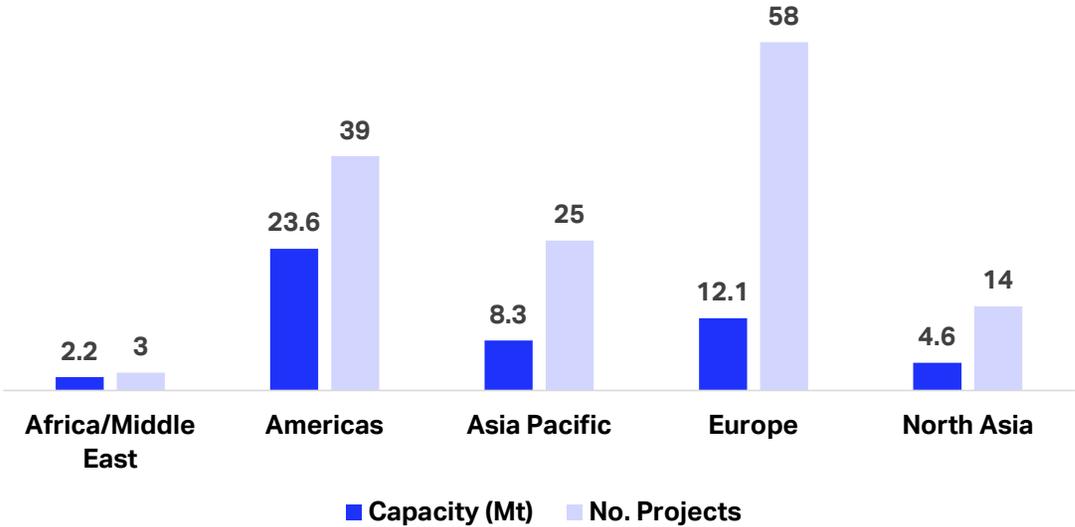
- Significant surge in Renewable projects announcement since 2023; but sluggish pace of commercialization
- We need balanced incentives to facilitate SAF production
- Government financing central to accelerate different SAF technologies
- Diversification of feedstocks & technologies via innovative accounting framework to overcome regional constraints.

***Note:** Renewable Fuel projects typically have a 3–5 year lag effect from Project Announcement to Commercialization. We therefore expect information for new project announcements for 2028-30 to come through iteratively over the next couple years.

Source: IATA Sustainability and Economics



Diversification in the Key



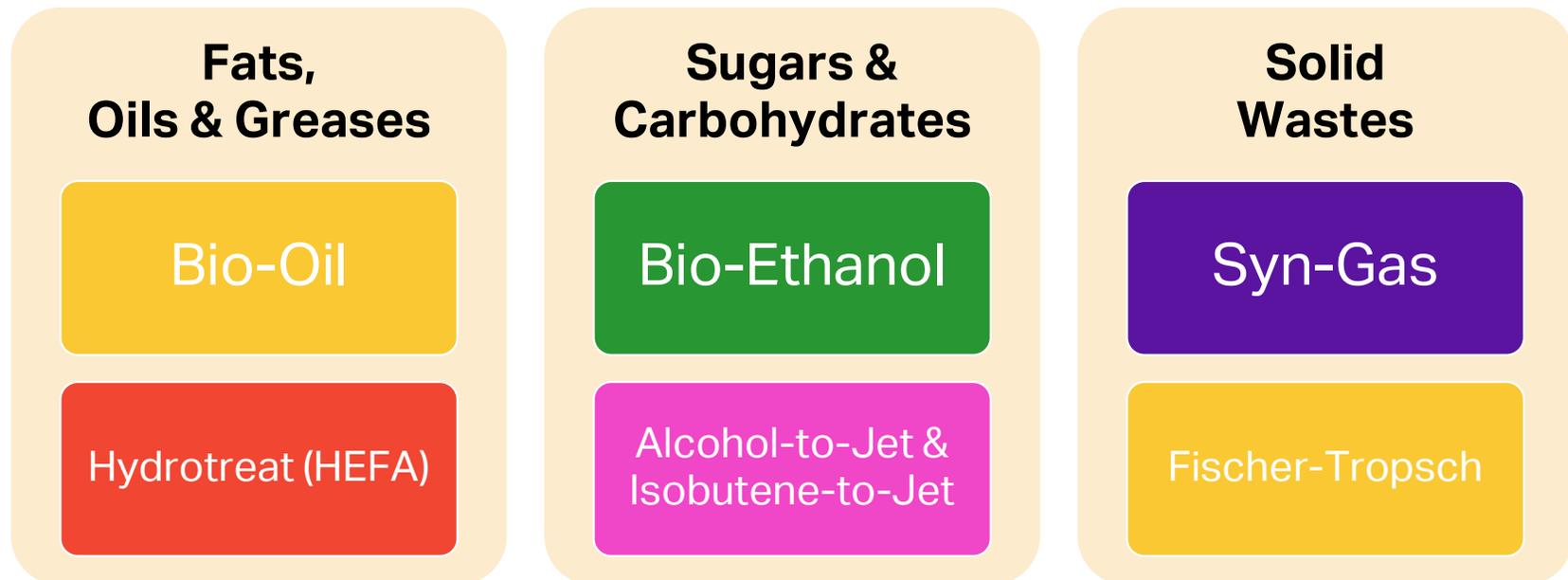
SAF Production Pathways - Percentage Split of Total Capacity

- **140** identified SAF projects progressing, by **100+** producers in **31** countries
- Focus of projects in certain geographies is aligned to policies to promote SAF
- HEFA will continue to dominate SAF production unless we accelerate deployment of alternate pathways

Source: IATA Sustainability and Economics



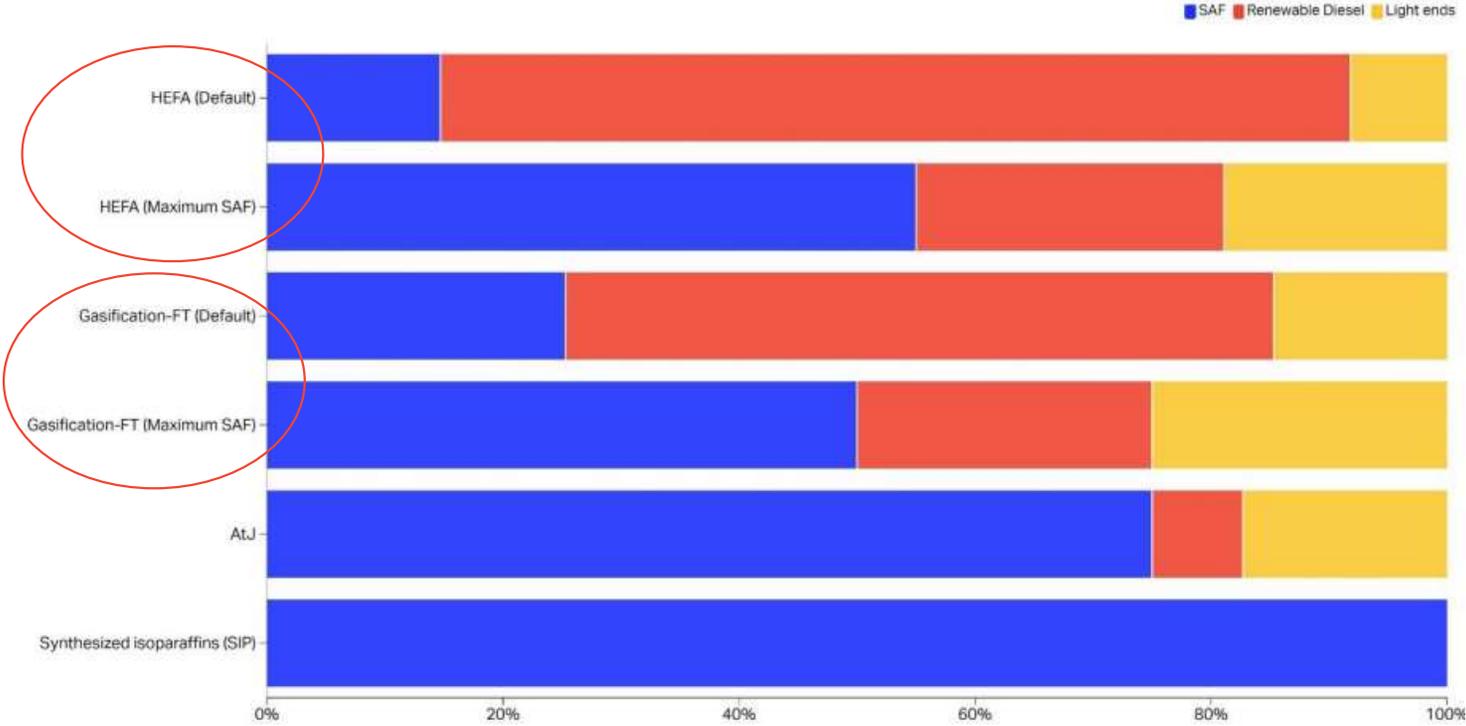
Feedstock Rationalization & Diversification needed



- HTL, Iso-butanol & FT using Biomass etc. can be instrumental role to expand feedstock base.
- Accelerating SAF requires all feedstocks and pathways to increase the production.

R&I focus required to maximizing SAF yields

Product yields for key SAF conversion pathways



Source: IATA Sustainability and Economics



SAF Production To-Date

Year	2019	2020	2021	2022	2023e	2024f
Estimated SAF Output (Mt)	<0.02	0.05	0.08	0.24	0.5	1.5*
Global Jet Fuel (Mt)	288	157	182	254	271*	285
SAF % of Global Jet Fuels	<0.01%	0.03%	0.04%	0.1%	0.2%	0.53%
% SAF from total RF capacity					3%	6%?

* Based on current projections and assumptions that delayed 2023 capacity will fully commercialize in 2024.

Source: IATA Sustainability and Economics



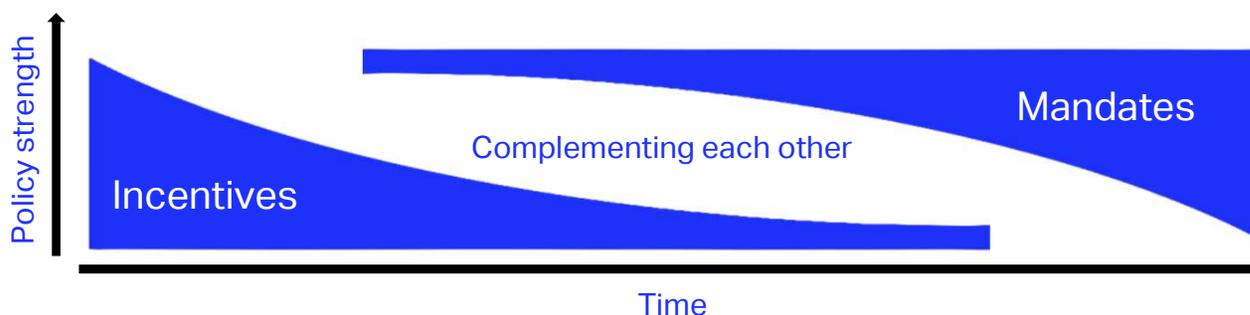
Key Enabler: Effective Policy Framework



- There is no one size fits all solution, nor right/wrong policy options *per se*.
- Successful SAF policy making may require a customized strategy specific to each State's own circumstances.

Policy instruments for SAFs

Timing of the policy instruments is the key



Any policies directed at SAF blending and use should be preceded by measures to stimulate SAF production!

Incentives should come first

- Create a functioning market first through incentives
- Stimulate new players and the diversification of SAF production
- Facilitate innovation + reduce unit cost + support 'first-of-a-kind' production facilities

Mandates to follow only when production is there

- Should be complemented with incentives
- Not in favor of any specific feedstock or pathways
- Combined with policies with mid- to long-term goals of ramping up SAF production

Essentials for continued progress

- All levers for Net Zero are essential but must be prioritized based on system readiness and maturity.
- Accelerated investment is a must where the role of traditional and new fuel companies is important.
- Incentives from governments to facilitate feedstock expansion & optimal SAF outputs from existing units.
- Regional diversification, feedstock rationalization, promote R&D to accelerate SAF production.
- Unlocking geographical barriers through use and recognition of a global SAF accounting framework by all parties

**Thank You!
Questions?**

